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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/649,794	08/28/2003	Tomoo Kawase	2635-174	5602
23117 7590 12/29/2006 NIXON & VANDERHYE, PC 901 NORTH GLEBE ROAD, 11TH FLOOR ARLINGTON, VA 22203			EXAMINER OLSEN, KAJ K	
			ART UNIT 1753	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		12/29/2006	PAPER	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

Application No.

10/649,794

Applicant(s)

KAWASE ET AL.

Examiner

Kaj K. Olsen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 8-28-2003.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_.

## **DETAILED ACTION**

### ***Specification***

1. The disclosure is objected to because of the following informalities: The specification doesn't appear to have ever defined the abbreviation PWM. For the purpose of examination, the examiner will interpret the set forth PWM as being a pulse width modulator.

Appropriate correction is required.

### ***Claim Objections***

2. Claims 1, 8, and 16 are objected to because of the following informalities: In the limitations beginning "a sensor signal", applicant misspells --from-- as "form". Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 5-7, 13-15, and 20-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Claims 5, 13, and 20 all set forth the use of a PWM signal. This abbreviation needs to be defined at least the first time it is utilized in the claims.

*Claim Rejections - 35 USC § 102*

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-4, 8-12, and 16-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Kurokawa et al (US 2002/0050455 A1) with or without evidence from Takami et al (USP 6,084,418).

8. Kurokawa discloses a gas concentration apparatus comprising a gas sensor having a sensor base including a solid electrolyte body 142 which partially defines a gas chamber 144 into which gas are admitted through a given diffusion resistance via aperture 141a and porous layer 147. See paragraph 0082. Kurokawa further discloses a pump cell 110 being made up of first and second electrodes (111, 112) affixed to the solid electrolyte body with electrode 111 being exposed to the gas chamber to selectively produce a sensor signal as a function of a pumped amount of given gas component. See fig. 1 and paragraph 0083. Kurokawa further discloses a electricity control circuit to produce a feeding signal to the first and second electrodes. See paragraph 0095. With respect to these voltage values being discreet, fig. 19 shows the voltage that is applied to the pump cell as changing by a  $\Delta V_p$ , which is a discreet change in the voltage being applied. In addition, Kurokawa uses a microcomputer with A/D and D/A converters (paragraph 0093), which means even if Kurokawa varied the applied voltages “continuously”, the voltages selected would be essentially discreet based on the bit number of the A/D and D/A

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converters utilized. Kurokawa also discloses a sensor signal detecting circuit to detect the sensor signal outputted from the pump cell. See paragraphs 0094-0097. Kurokawa further discloses the presence of a loss pass filter (LPF) 180 in the voltage application circuit. As the instant invention evidences, a LPF reads on the defined change limiting or blurring circuit. Moreover, a LPF blurs both the feeding signal, but would also blur the sensor signal itself. In particular, see Takami, fig. 4a-b and 11a-d, which shows the effect that a LPF has on both the voltage being applied (i.e. the feeding circuit), but also the resulting measured current. Both the applied voltage and the measured current get blurred or are subject to a change limiting function.

9. With respect to an integrating circuit, an integrator is another term for low pass filter.
10. With respect to the electricity control circuit working to determine a target value of the feeding signal as a function of the sensor signal, see paragraph 0097.
11. With respect to the second pump cell working to control the feeding signal, see paragraph 0102.

### ***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 5-7, 13-15, and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurokawa in view of Walde (USP 6,300,754).

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14. Kurokawa discloses all the limitations of the claims, but did not explicitly recite the use of a pulse width modulator PWM signal. Walde teaches in an alternate NOx sensor that conventional pump current sources are limited in resolution to the number of bits provided by the microcontroller. See col. 1, ll. 35-50. Walde teaches around this problem by utilizing a combination of a PWM and a low pass filter to generate the desired voltage for the pump cells. See col. 5, ll. 28-49. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Walde for the sensor of Kurokawa so as to generate more precise voltages for the pump cells without having to utilize more expensive (i.e. higher bit) voltage controllers.

### *Conclusion*

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Mabuchi et al (USP 6,334,946) and Iwata (USP 5,461,902) teach the use of low pass filters before the sensor outputs.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (571) 272-1344. The examiner can normally be reached on Monday through Friday from 8:00 A.M. to 4:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

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may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AU 1753  
December 22, 2006

A handwritten signature in black ink, appearing to read 'Kaj K. Olsen', with a long horizontal flourish extending to the right.

**KAJ K. OLSEN**  
**PRIMARY EXAMINER**